



Like a virtual test lab

3D CAD now allows designers to quickly model and style products. They can check how parts move, and how they fit together, but with many products there are other technical requirements. For example, to check the strength of a part the designer must use simple hand calculations, rely on copying existing products or have the parts made and physically tested. Finite Element Analysis (FEA) is a powerful tool bridging this gap, it combines with 3D CAD to give designers and engineers a virtual test lab.

How it works

A real world set of test conditions are constructed within the software and applied to a 3D CAD model. Parts are given material properties and can be connected together to form assemblies. The simulated test is run using a complex mathematical solver that produces a series of graphical and numerical results for analysis by designers and engineers.

Learning from these results, a range of preferred design concepts can be tested quickly and cheaply for comparison. This process allows large scale improvements to be undertaken without costly (in both time and money) prototypes being constructed for physical and often destructive testing.

Advantages:

- Test future products before they are produced.
- Simulate real-world operating or test conditions.
- Compare alternative designs rapidly.
- Study the interaction between different components.
- Optimize the design for material usage and production.

FEA can be used to simulate:

- stress and strain
- load transfers
- displacement or flex
- drop & impact testing
- fatigue life
- frequency & buckling
- thermal stress
- heat transfer

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